

IC10 Rec'd PCT/PTO 28 FEB 2002

FORM PTO-1390
(REV 10-94)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

DOCKET #: 4925-213PUS

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING
UNDER 35 U.S.C. 371**

U.S. APPLICATION NO.

If known, see 37 CFR 1.57
10/070212

INTERNATIONAL APPLICATION NO.

PCT/EP00/03478

INTERNATIONAL FILING DATE

17 April 2000

PRIORITY DATE CLAIMED

13 September 1999

TITLE OF INVENTION

Advance Service Architecture For Next Generation Network Services and Intelligent Data Network Router

APPLICANT(S) FOR DO/EO/US

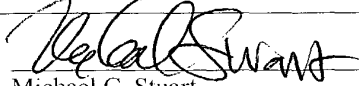
Martin BERGENWALL; Kengatharan SIVALINGAM; Sami USKELA

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☒ are transmitted herewith (required only if not transmitted by the International Bureau). (See Reply to Written Opinion)
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). **Unexecuted**
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. Below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
- ☒ Other items or information (*specify*): PCT Publication Sheet, Int'l Search Report, Int'l Preliminary Examination Report, Written Opinion, Reply to Written Opinion (12/6/01), Invitation to Restrict or to Pay Additional Fees, Reply to Invitation to Restrict or to Pay Additional Fees (10/29/01), PCT Request, Notification of the Recording of a Change, Information Concerning Elected Offices Notified of Their Election, Notice Informing the Applicant of the Communication of the International Application to the Designated Offices, Notification of Receipt of Record Copy

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.51) 10/070212		INTERNATIONAL APPLICATION NO. PCT/EP00/03478		ATTORNEY'S DOCKET NUMBER 4925-213PUS	
17.[x]The following fees are submitted:					
Basic National Fee (37 CFR 1.492(a)(1)-(5)):					
Search Report has been prepared by the EPO or JPO				\$890.00	
International preliminary examination fee paid to USPTO (37 CFR 1.482).....				\$710.00	
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)).....				\$740.00	
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO				\$1040.00	
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)				\$100.00	
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$	890
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
Claims	Number Filed	Number Extra	Rate		
Total Claims	15 - 20 =		x \$18.00	\$	
Independent Claims	2 - 3 =		x \$84.00	\$	
Multiple dependent claim(s) (if applicable)			+ \$280.00	\$	
TOTAL OF ABOVE CALCULATIONS =				\$	890
Reduction of 1/2 for filing by small entity, if applicable.				\$	
SUBTOTAL =				\$	890
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$	890
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by the appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$	
TOTAL FEES ENCLOSED					\$890
				Amount to be refunded:	\$
				charged:	\$
a. <input checked="" type="checkbox"/> One check in the amount of \$ <u>890</u> to cover the above fee is enclosed.					
b. <input type="checkbox"/> Please charge my Deposit Account No. <u>03-2412</u> in the amount of \$ <u> </u> to cover the above fees. A duplicate copy of this sheet is enclosed.					
c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>03-2412</u> . A duplicate copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO: <u>Michael C. Stuart</u> Cohen, Pontani, Lieberman & Pavane 551 Fifth Avenue, Suite 1210 New York, New York 10176			 <u>Michael C. Stuart</u> Registration Number: <u>35,698</u> February 28, 2002 Tel: (212) 687-2770		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Martin BERGENWALL et al.

Serial No.: 10/070,212

Filed: 28 February 2002

For: Advance Service Architecture For Next
Generation Network Services and Intelligent
Data Network Router

SECOND PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231
BOX PCT

S I R:

Prior to examination of the above-identified application please amend the
application as follows:

In the Specification:

Page 1, before line 6, the title beginning with "FIELD OF THE INVENTION", insert the
following title and paragraph:

--PRIORITY CLAIM

This is a national stage of PCT application No. PCT/EP00/03478, filed on April 17, 2000,
and of PCT Application No. PCT/EP99/06759, filed on September 13, 1999. Priority is claimed
on both of these applications.--


By Express Mail # EL262962738US June 12, 2002

REMARKS

This preliminary amendment is presented to complete the claim for priority. Early examination and favorable consideration of the above-identified application is earnestly solicited.

Any additional fees or charges required at this time in connection with the application may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,
COHEN, PONTANI, LIEBERMAN & PAVANE

By: 
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12 June 2002

By Express Mail # EL489597526US · February 28, 2002

Attorney Docket # 4925-213PUS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re National Phase PCT Application of

Martin BERGENWALL et al.

International Appln. No.: PCT/EP00/03478

International Filing Date: 17 April 2000

For: Advance Service Architecture For Next
Generation Network Services and Intelligent
Data Network Router

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231
BOX PCT

S I R:

Prior to examination of the above-identified application please amend the application as follows:

IN THE SPECIFICATION:

Page 17, line 1, delete "CLAIMS:" and insert therefor --What is claimed is:--.

IN THE CLAIMS (As amended in the Response to Written Opinion dated December 6, 2001):

Please amend 11 to read as follows:

11. A data network system in which an apparatus according to claim 1 is employed.

By Express Mail # EL489597526US · February 28, 2002

Add the following new claims:

12. A data network system in which an apparatus according to claim 2 is employed.
13. A data network system in which an apparatus according to claim 3 is employed.
14. A data network system in which an apparatus according to claim 4 is employed.
15. A data network system in which an apparatus according to claim 5 is employed.

By Express Mail # EL489597526US · February 28, 2002

REMARKS


This preliminary amendment is presented to place the application in proper form for examination and to eliminate multiple dependency from the present claims. No new matter has been added. Early examination and favorable consideration of the above-identified application is earnestly solicited.

Attached hereto is a mark-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**".

Any additional fees or charges required at this time in connection with the application may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,
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By: _____


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28 February 2002

10070212.061202

By Express Mail # EL489597526US · February 28, 2002

AMENDMENTS TO THE SPECIFICATION AND CLAIMS SHOWING CHANGES

In the Claims:

11. A data network system in which an apparatus according to claim 1 [any one of claims 1 to 5] is employed.

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TITLE OF THE INVENTION

Advanced service architecture for next generation network
services and intelligent data network router.

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FIELD OF THE INVENTION

The present invention relates to packet data transmission
between mobile networks supporting Internet Protocol (IP)
10 like the General Packet Radio Service (GPRS) network and data
networks like the Internet, and in particular to a method and
an apparatus for receiving and routing data packets in a data
network. Moreover, the present invention relates to a method
and an apparatus for receiving data packets and providing
15 services for the received data packets in a data network.

BACKGROUND OF THE INVENTION

Data or packet-switched networks like the Internet comprise
20 routers for routing data packets in the data network. In a
conventional router, routing of data packets is affected by a
classifier for detecting incoming data packets. The
conventional Internet routers comprise semi-static routing
tables for routing the data packets, the routing tables being
25 updated only via separate management procedures or via dialog
between routers using special routing protocols.

However, with conventional routers several problems arise. In
case of new routers propagating with conventional routing
30 protocols, propagation of data packets in the network is slow
and a dynamic update of routers is not easy, since all
routers must know the handling of all packets and if the
handling for one user changes all routing tables in all
routers must be updated. Consequently, the routing tables of
35 conventional routers are getting large. If every user wants

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his own packet handling the routing tables grow too much for the routers.

Moreover, similar problems arise with a conventional service model in a packet data environment. The conventional service model consists of a service trigger and a service logic which may be located in a router. Such model does not provide the flexibility required by the advanced services in the packet data domain.

10

SUMMARY OF THE INVENTION

It is an object of the present invention to improve routing possibilities by providing dynamically and per user configurable routing in a data network as well as a dynamic and flexible service architecture.

15

According to a first aspect of the present invention, there is provided an apparatus for receiving a plurality of data packets and for routing the data packets in a data network. This apparatus comprises storing means for storing a pre-defined list of rules for detecting special data packets, detecting means for detecting special data packets in the received plurality of data packets on the basis of the pre-defined list of rules stored in the storing means, and routing means for requesting instructions for the special data packets detected by the detecting means and for routing the special data packets in accordance with instructions received on request.

20
25
30

Furthermore, according to the first aspect of the present invention, there is provided a method for receiving a plurality of data packets and for routing the data packets in a data network. According to this method, a pre-defined list of rules for detecting special data packets is stored, special data packets in the received plurality of data

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packets are detected on the basis of the stored pre-defined list of rules, and instructions for the detected special data packets are requested and the special data packets are routed in accordance with instructions received on request.

5

Furthermore, there is provided a data network system in which the apparatus according to the first aspect of the present invention is employed.

10 The apparatus according to the first aspect of the present invention further comprises an internal entity. Detected special data packets are notified to the internal entity by the routing means which requests instructions for the special data packets therefrom.

15

Alternatively, the routing means notifies an external entity of the detected special data packets and requests instructions for the special data packets therefrom.

20 According to the present invention, routing in accordance with instructions received on request also includes the "normal routing" possibility where a command from the external or internal entity states that no special routing is necessary, for example when only statistics and information
25 is to be collected but no special routing is required.

According to the present invention, the original rules that indicate which packets are special packets and need special handling are stored in the storing means by the external
30 entity.

Moreover, the rules stored in the storing means as well as the instructions stored in the internal entity can be dynamically determined and updated in real-time in response
35 to events, which are detected by the detecting means and reported by the routing means to the external entity. Thus,

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the content of the storing means and the internal entity can be changed "on the fly", i.e. during active operations. The internal entity may also update, add or remove some rules.

5 For example, the external entity may store some rules to detect special packets. When such a packet arrives in the router the external or internal entity may modify the rules, e.g. remove the specific rule if only the first matching packet was of interest.

10

In routing the special data packets, the routing means is able to modify the special data packets in accordance with the received instructions. For example, the routing means can modify the content of the data packets, e.g. the packet

15 headers, it can duplicate data packets or control dropping of data packets.

Moreover, according to the present invention, the routing means is able to communicate with an external charging entity
20 for charging the routing of the special data packets. For example, the routing means can collect charging information from the charging entity and send charging information to the charging entity. In this way, the special handling of data packets can be charged.

25

For example, the detection of special packets can be based on any data within the special packet including but not limited to the source or destination IP address, TCP/UDP
(Transmission Control Protocol/User Datagram Protocol) port
30 numbers or other IP/UDP/TCP header fields. In other words, the pre-defined list of rules for detecting special packets can include such packet identification marks.

According to a second aspect of the present invention, there
35 is provided an apparatus for receiving a plurality of data packets and for providing services for the data packets in a

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data network. This apparatus comprises service deciding means for deciding services to be executed for the received plurality of data packets, and service executing means launched by the service deciding means for a decided service.

5 The service executing means executes the decided service for the received data packets. Control means are activated when the service executing means are launched, and control the service deciding means and the service executing means.

10 In addition, according to the second aspect, there is provided a method of receiving a plurality of data packets and providing services for the data packets in a data network. In this method, services to be executed for the received plurality of data packets are decided and a service
15 decided for the received data packets is launched. Control means are activated for the decided service, and the decided service is executed, wherein the control means control the deciding of services and the execution of decided services.

20 Finally, according to the present invention, there is provided a data network system in which an apparatus according to the second aspect is employed.

The apparatus according to the second aspect further
25 comprises a database for storing service deciding information which can be read by the service deciding means from the database.

Furthermore, the apparatus comprises service data storing
30 means for storing service specific data that is used by the service executing means. The service specific data comprises the data to run a specific service. For example, the service specific data for the premium rate service is the destination address and tariff.

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The service specific data is not part of the service
executing means. For example, in case an advertisement adding
service is launched, the service deciding means know when to
insert the advertisements, the service executing means know
5 how to insert the advertisements and the service specific
data contains the actual advertisements. The service specific
data may be static or dynamic. For example, it may be dynamic
for an advertisement service using location dependent
advertisements.

10

The control means is arranged to access user specific data
and to supply the user specific data to the service executing
means. The user specific data comprises user preferences
regarding a specific service. For example, the user specific
15 data can contain user preferences regarding advertisement
selection or packet filtering options in a firewall service.

When a service is launched, the corresponding control means
is also activated. Now, the service executing means is able
20 to contact the control means during its execution. For
example, in case the service executing means needs user
interaction, the control means is able to ask the user and
pass the answer to the service executing means.

25

In addition, the control means is arranged to create new
deciding information for the service deciding means. The
control means can create new deciding information for a
current service, it can delete deciding information or it can
30 activate a totally new service. Thus, new deciding
information for the service deciding means, i.e. triggers,
can be created on the fly and added to an active service by
the control means.

35 In a packet data environment, the service executing means may
be located in the router, while the control means may be

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located in the Service Control Point (SCP). The router may route the data packets received by the service deciding means in accordance with the services executed on the data packets by the service executing means.

5

According to an embodiment of the second aspect of the present invention, the service deciding means are called service trigger(s), the service executing means are called service logic and the control means are called event handler.

10 According to Intelligent Network (IN) functional entities, the functions of the service trigger may be implemented in a Service Switching Function (SSF), the service logic may be represented by a Service Logic Program (SLP) and the functionality of the event handler may be performed in a
15 Service Management Point (SMP) and a Specialized Resource Function (SRF), in order to perform message based user interaction according to the Wireless Application Protocol (WAP) or Unstructured Supplementary Service Data (USSD). The service specific data and user specific data may be stored in
20 an SCP database or Service Data Function (SDF) database.

With the special packet handling according to the present invention, it is enough for the router to know that some kind of special handling is needed for special packets. In
25 practice, this means that part of the routing tables can be located in an external entity from which the router requests instructions when needed.

Moreover, with the handling of special packets it is easy to
30 manage scenarios that involve more than one router. For example, a tunnel can dynamically be created from one router to another through special packet handling rules and with the help of an external entity connected to both routers involved in the tunnel. Different external entities may also be
35 connected to each other. On the other hand, one router may be connected to different external entities.

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According to the present invention, more intelligence is given to a data network router, enabling implementation of more versatile and dynamic services for users.

5

In this context, reliable and fast delivery of high priority data packets can be guaranteed. That is, according to the present invention, the delay problem in using IP for real-time applications can be reduced or even eliminated.

10

Moreover, according to the present invention, a service architecture is presented, which uses techniques such as event handler interaction, trigger updating and service or user specific data updating, to control and execute services in a more dynamic way.

15

Thus, according to the presented service architecture, the implementation of data services with advanced features for data networks is facilitated.

20

In the following the present invention will be described by way of preferred embodiments thereof with reference to the accompanying drawings.

25 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a schematic block diagram of the basic components of a router according to a first embodiment of the present invention;

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Fig. 2 shows a flowchart of the basic steps of a method according to the first embodiment of the present invention;

Fig. 3 shows a schematic block diagram of the basic components of a service architecture according to a second embodiment of the present invention; and

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Fig. 4 shows a flowchart of the basic steps of a method according to the second embodiment of the present invention.

5 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 shows a schematic block diagram of a router in a data network like the Internet according to a first embodiment of the present invention. The router 1 comprises storing means
10 11, detecting means 12, routing means 13 and an internal entity 14.

The detecting means 12 receives data packets from a subscriber of a mobile network supporting Internet Protocol
15 like the GPRS network, or data packets which are originated in the data network. In receiving the data packets, the detecting means 12 checks these packets on special packets requiring special handling by the routing means 13, by referring to a pre-defined list of rules for detecting
20 special packets, that is stored in the storing means 11.

When the detecting means 12 detects a special packet, it informs the routing means 13 and forwards the special packet to it. Subsequently, the routing means 13 notifies the
25 detection of a special packet to the internal entity 14 or an external entity 2, requesting instructions for handling the special packet. Having received the requested instructions, the routing means 13 handles the special data packets in accordance with these instructions, for example modifies the
30 packet and outputs or routes it accordingly.

The routing means 13 also communicates with a charging entity 3 for providing charging for some special handling of packets. The charging entity 3 is in a way just another
35 external entity receiving charging related events from the router 1.

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The contents of the storing means 11 and the internal entity 14 can be updated dynamically in real-time by the external entity 2 in response to events detected by the detecting means 12 and reported to the external entity 2 by the routing means 13.

A method for receiving and routing data packets according to the first embodiment of the present invention will be described with reference to Fig. 2.

In step S1 in Fig. 2, rules for detecting special data packets are stored in a list in the storing means 11. In step S2, data packets are received and it is checked in step S3, whether a received data packet is a special data packet, by referring to the stored rules. If a special data packet is detected in step S3, instructions for handling the special packet are requested in step S4. After having received the requested instructions, the special packet is handled accordingly in step S5.

On the other hand, in case no special data packet is detected in step S3, the "normal" data packet is routed according to a routing table (not shown in Fig. 1) by the routing means 13 (step S6), the routing table being provided in the router 1.

Next, a second embodiment of the present invention will be described with reference to Figs. 3 and 4.

Fig. 3 shows a service architecture which is suitable for next generation services, in particular packet data services. As shown in Fig. 3, a service trigger 42 receives data packets. The service trigger 42 then decides whether to launch a service logic 43 or not. In case the service trigger 42 launches the service logic 43, the service logic 43 executes the service decided by the service trigger 42. The

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service trigger 42 reads trigger information from a database 41.

When the service logic 43 is launched by the service trigger
5 42, a corresponding event handler 5 is also activated. The
service logic 43 is able to contact the event handler during
its execution. In case the service logic 43 needs user
interaction, the event handler 5 is able to ask the user and
pass the answer to the service logic 43. The event handler 5
10 can create new triggers or trigger information for the
current service executed in the service logic 43, it can
delete a trigger or it can activate a totally new service. In
other words, new triggers or trigger information can be
created "on the fly" and added to an active service by the
15 event handler 5. In addition, the event handler 5 is able to
access user specific data 6 containing user preferences
regarding a specific service.

The service logic 43 accesses service specific data 44 which
20 comprises data to run a specific service, for example
destination address and tariff data for a premium rate
service. The service specific data 44 is not part of the
actual logic.

25 In an IN packet data environment, the service logic 43 may be
located in a router, and the event handler may be located in
an SCP (Service Control Point). For example, in case packet
data is sent via an SSP (Service Switching Point) to the
service trigger 42, the service trigger 42 checks whether to
30 send a message to the SCP. If the service trigger 42 sends
the message, this message is received by a dialog handler in
the SCP. The dialog handler passes the message to the event
handler 5 which may ask the user whether a service for the
packet data, which is to be executed in the service logic 43
35 should be activated. The result is passed to the service
logic 43. In case the user decides to activate the service,

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the SCP allows the SSP to continue the sending of packet data.

Fig. 4 shows a flowchart illustrating the basic steps of the method of receiving data packets and providing services for the data packets according to the present invention. In step S51, the service trigger 42 receives data packets, for example from an SSP. In step S52, the service trigger 42 decides whether a service is to be executed for the received data packets.

In case the service trigger 42 decides in step S53 on the basis of the trigger information in the database 41 that no service is required for the received data packets the process is terminated. In contrast thereto, in case a service is required, the process goes to step S54 where the service logic 43 is launched for the service to be executed. After that, in step S55, the event handler 5 corresponding to the service logic 43 is activated. In this context, the service trigger 42 may contact the event handler 5 as mentioned above, which may ask the user whether the decided service should be activated. In case the decided service should be activated, the service is executed by the service logic 43 in step S56, and then the process is terminated.

The data packets for which a service has been executed by the service logic 43 can be routed in accordance with this service. Hence, the above-described service architecture basically corresponds to the arrangement of the router 1 as shown in Fig. 1. In other words, the service trigger 42, the service logic 43 and the event handler 5 respectively provide similar functions as the detecting means 12, the routing means 13 and the external entity 2 according to Fig. 1.

In order to activate a service for a specific user according to the present invention it is required to get appropriate

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service trigger(s), service logic and event handler. The choice of the appropriate event handler may for example depend on what kind of terminal type is used by the user, e.g. GSM (Global System for Mobile communications), WAP

5 (Wireless Application Protocol) or GPRS (General Packet Radio Service), if user interaction is required. In a group service there can also exist different event handlers with different access rights for the group members. The group owner can have a more powerful event handler than other group members, i.e.

10 the owner's event handler can be allowed to modify the triggers for the service while others are not. A further step in activating a service is to load any service specific data that is needed statically. Dynamic service specific data is loaded by the service logic. The final step is to get the

15 user specific data for the service.

In the following, a first application example of the present invention relating to the delay problem in using IP for real-time applications will be described.

20

A rule for detecting special packets may be the determination of the priority of a packet. According to the first application example, the priority of a data packet can be determined by comparing the destination number corresponding

25 to E.164 or the IP address of the received packet with the numbers or addresses stored in connection with the corresponding rule in the storing means 11. For example, when the destination number or IP address of the packet is listed in the corresponding rule, the packet is a special data

30 packet having high priority. The priority of a data packet can also be detected by checking the content of the packet, e.g. the protocol header, as to whether this content is listed in the corresponding rule.

35 In case a special data packet, i.e. a packet having high priority such as an emergency call, is detected by the

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detecting means 12, the routing means 13 is informed and notifies the detection to the internal or external entity and requests instructions for handling the special data packet. Thereupon, the internal or external entity informs the
5 routing means 13 that the delivery of the special packet is to be prioritized, which then is carried out by the routing means 13.

With this first application example of the present invention,
10 reliable and fast delivery of high priority data packets can be guaranteed. That is, according to the present invention, the delay problem in using IP for real-time applications can be reduced or even eliminated.

15 Next, a second application example of the present invention relating to family or group service for data networks will be described.

The purpose of the family service is to provide a convenient
20 method to define a user group and various properties for the group members. The service is targeted for families or small companies. The context of the service is mobile networks supporting Internet Protocol, such as GPRS.

25 As the use of data services gets more popular, the user group concept is a convenient way to add value to small companies or families. A group consists of a set of predefined users, recognized by SIM (Subscriber Identity Module) cards or passwords or the like. For example, the predefined users can
30 be the members of a particular family. Each group and every member of the respective groups has properties that can be used to restrict or allow different operations. For example, parents might want to restrict the use of WAP (Wireless Application Part) services during school hours, or only allow
35 access to pre-defined content sites. The group can have

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different properties for different users or a single property can be applied to all members of the group.

According to the second application example, the rule is to
5 determine data packets belonging to members of a group. For this purpose, a list of groups and for each group a list of current members is provided in the storing means 11. In other words, in a corresponding rule in the list of rules stored in the storing means 11, group IP addresses and member IP
10 addresses are listed.

As mentioned above, each group and each member of the group can have a set of properties. An owner like the family head paying the phone bill is defined for each group. The owner is
15 allowed to modify the properties of the group members. A group can have multiple owners. The group member properties define the access rights for the members. Examples for properties are allowed IP addresses, allowed access times, allowed maximum access times, and the like.

20 According to GPRS, the above-mentioned properties can be defined in the GGSN (Gateway GPRS Support Node) representing the external entity according to Fig. 1. The GGSN is also able to supply the group IP addresses and member IP addresses
25 to the storing means 11.

For example, when the detecting means 12 detects that a packet is to be transmitted to a group member by comparing the destination IP address of the packet with the address
30 listed in the corresponding rule stored in the storing means 11, it informs the routing means 13 which notifies the detected packet to the GGSN and requests instructions from the GGSN for handling the detected special packet. The GGSN may determine upon this request that the special packet was
35 originated from an unallowed IP address or at an unallowed access time or that the maximum access time has been

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exceeded, and instructs the routing means 13 to drop the packet.

Alternatively, packets coming from certain group members,
5 i.e. packets having a certain source IP address, can be
dropped by the routing means 13 in accordance with
instructions received from the GGSN.

Hence, according to the second application example of the
10 present invention, a censoring function is implemented in the
router 1 simply by adding a rule for detecting special
packets. That is, according to the present invention, the
implementation of family or group services for data networks
is facilitated.

15

While the invention has been described with reference to
preferred embodiments, the description is illustrative of the
invention and is not to be construed as limiting the
invention. Various modifications and applications may occur
20 to those skilled in the art without departing from the true
spirit and scope of the invention as defined by the appended
claims.

Enclosure of December 6, 2001

PCT Patent Application No.: PCT/EP00/03478
NOKIA NETWORKS OY
Our ref.: WO 26444

New claims 1 to 11

1. An apparatus (1) for receiving a plurality of data packets and for routing the data packets in a data network, comprising:

storing means (11) for storing a pre-defined list of rules for detecting special data packets;

detecting means (12) for detecting special data packets in the received plurality of data packets on the basis of the pre-defined list of rules stored in said storing means (11); and

routing means (13) for requesting instructions for the special data packets detected by said detecting means (12) and for routing the special data packets in accordance with instructions received on request,

characterized by:

an internal entity (14) for storing instructions for the special data packets,

wherein said routing means (13) is arranged to notify said internal entity (14) of the detected special data packets and request instructions for the special data packets from said internal entity (14), and

wherein an external entity (2) is arranged to determine and update the instructions stored in said internal entity (14) during active operations.

2. The apparatus according to claim 1, wherein said routing means (13) is arranged to notify the external entity (2) of the detected special data packets and request instructions for the special data packets from said external entity (2).

3. The apparatus according to claim 1, wherein said external entity is arranged to determine and update the rules stored in said storing means (11) during active operations.

4. The apparatus according to claim 1, wherein said routing means (13) is arranged to modify the special data packets in accordance with the received instructions.

5. The apparatus according to claim 1, wherein said routing means (13) is arranged to communicate with an external charging entity (3) for charging the routing of the special data packets.

6. A method for receiving a plurality of data packets and for routing the data packets in a data network, comprising the steps of:

storing (S1) a pre-defined list of rules for detecting special data packets;

detecting (S3) special data packets in the received plurality of data packets on the basis of the stored pre-defined list of rules; and

requesting (S4) instructions for the detected special data packets and routing (S5) the special data packets in accordance with instructions received on request,

characterized by the steps of:

in the requesting step, notifying an internal entity (14) of the detected special data packets and requesting instructions for the special data packets from said internal entity (14),

wherein the instructions stored in said internal entity (14) are determined and updated by an external entity (2) during active operations.

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7. The method according to claim 6, wherein said requesting step (S4) comprises the steps of:

notifying said external entity (2) of the detected special data packets; and

requesting instructions for the special data packets from said external entity (2).

8. The method according to claim 6, wherein the rules stored in said storing step are determined and updated by said external entity (2) during active operations.

9. The method according to claim 6, wherein said routing step (S5) comprises the step of:

modifying the special data packets in accordance with the received instructions.

10. The method according to claim 6, comprising the further step of:

communicating with an external charging entity (3) for charging the routing of the special data packets.

11. A data network system in which an apparatus according to any one of claims 1 to 5 is employed.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
22 March 2001 (22.03.2001)

PCT

(10) International Publication Number
WO 01/20856 A2

(51) International Patent Classification⁷: **H04L 12/56**

(21) International Application Number: PCT/EP00/03478

(22) International Filing Date: 17 April 2000 (17.04.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PCT/EP99/06759
13 September 1999 (13.09.1999) EP

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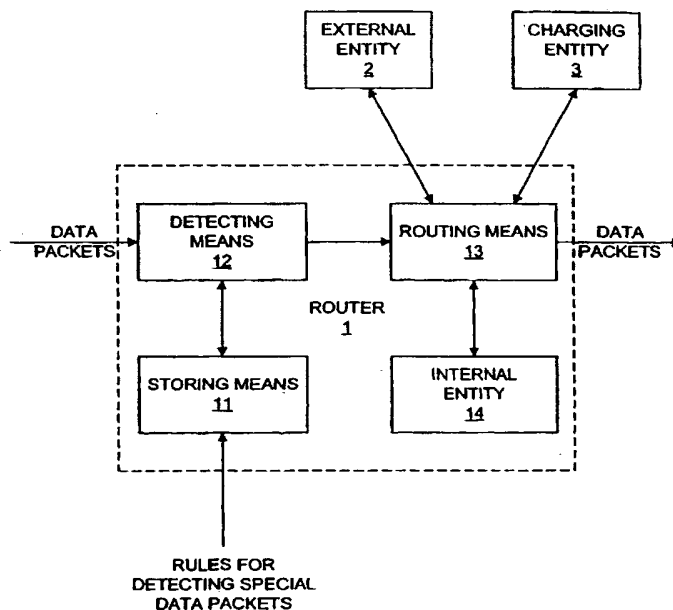
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(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU,

[Continued on next page]

(54) Title: **ADVANCED SERVICE ARCHITECTURE FOR NEXT GENERATION NETWORK SERVICES AND INTELLIGENT DATA NETWORK ROUTER**



(57) Abstract: According to the present invention, a plurality of data packets are received and routed by a router (1) in a data network. The router (1) comprises storing means (11) for storing a pre-defined list of rules for detecting special data packets, detecting means (12) for detecting special data packets in the received plurality of data packets on the basis of the pre-defined list of rules stored in said storing means (11), and routing means (13) for requesting instructions for the special data packets

[Continued on next page]

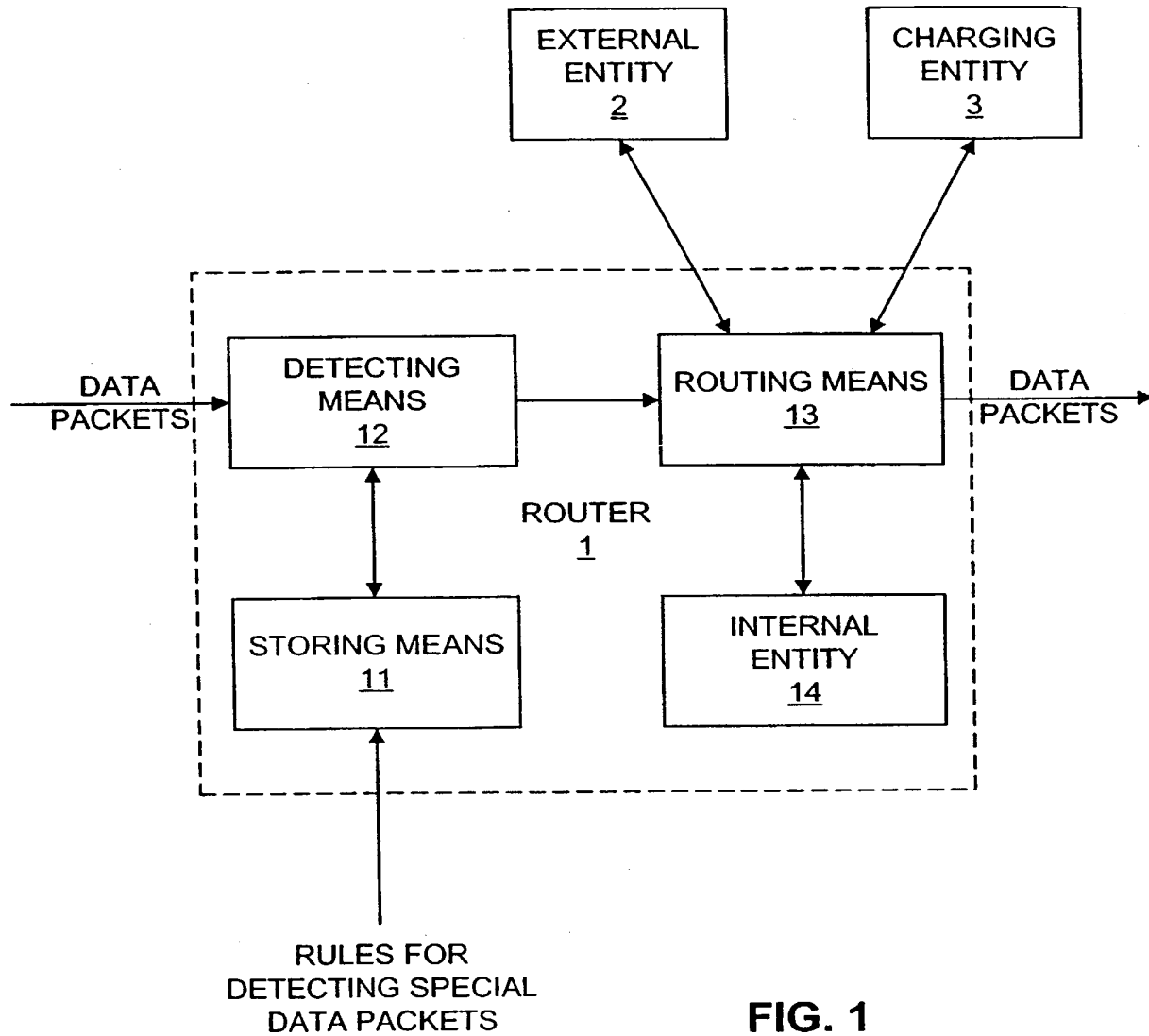


FIG. 1

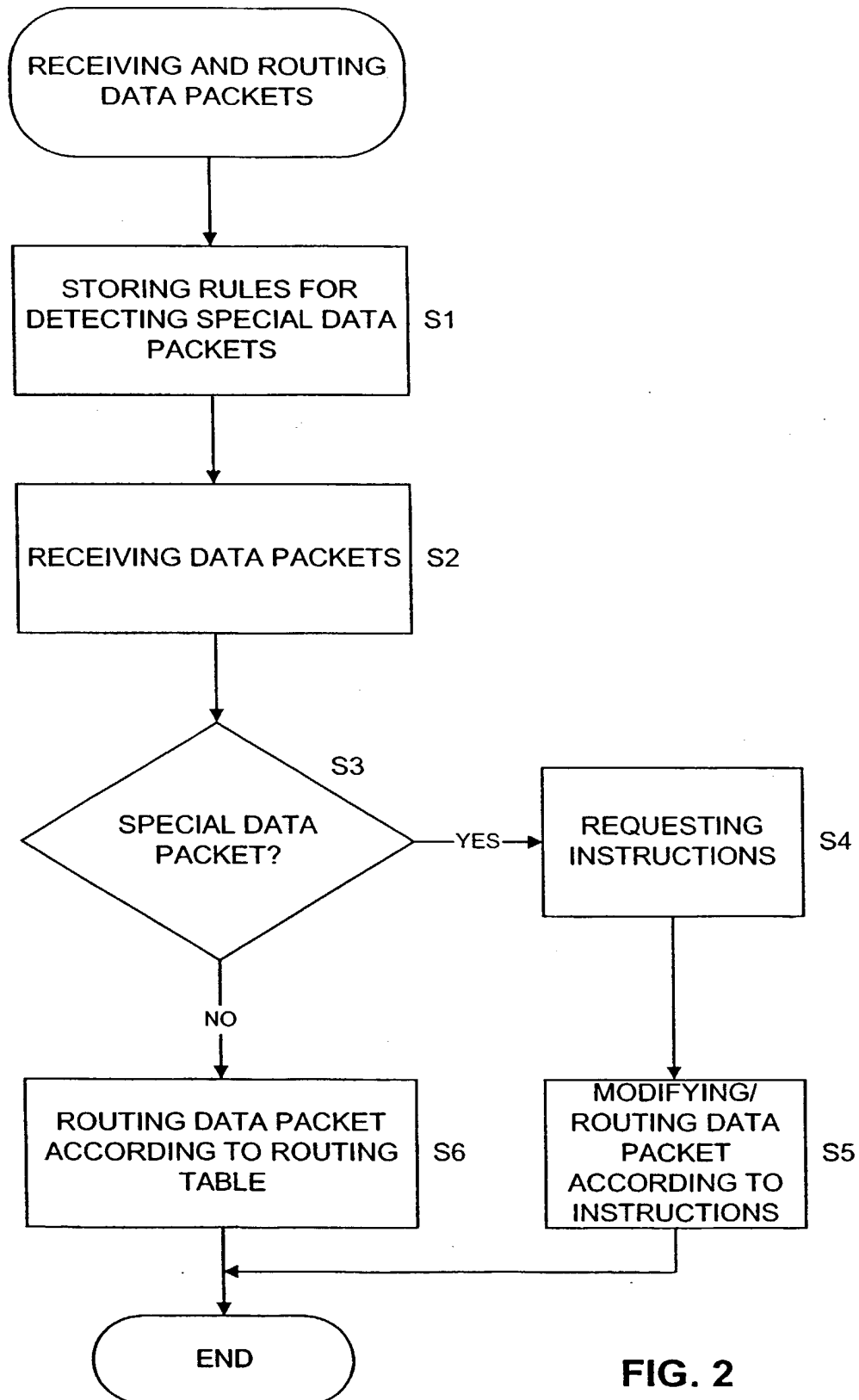


FIG. 2

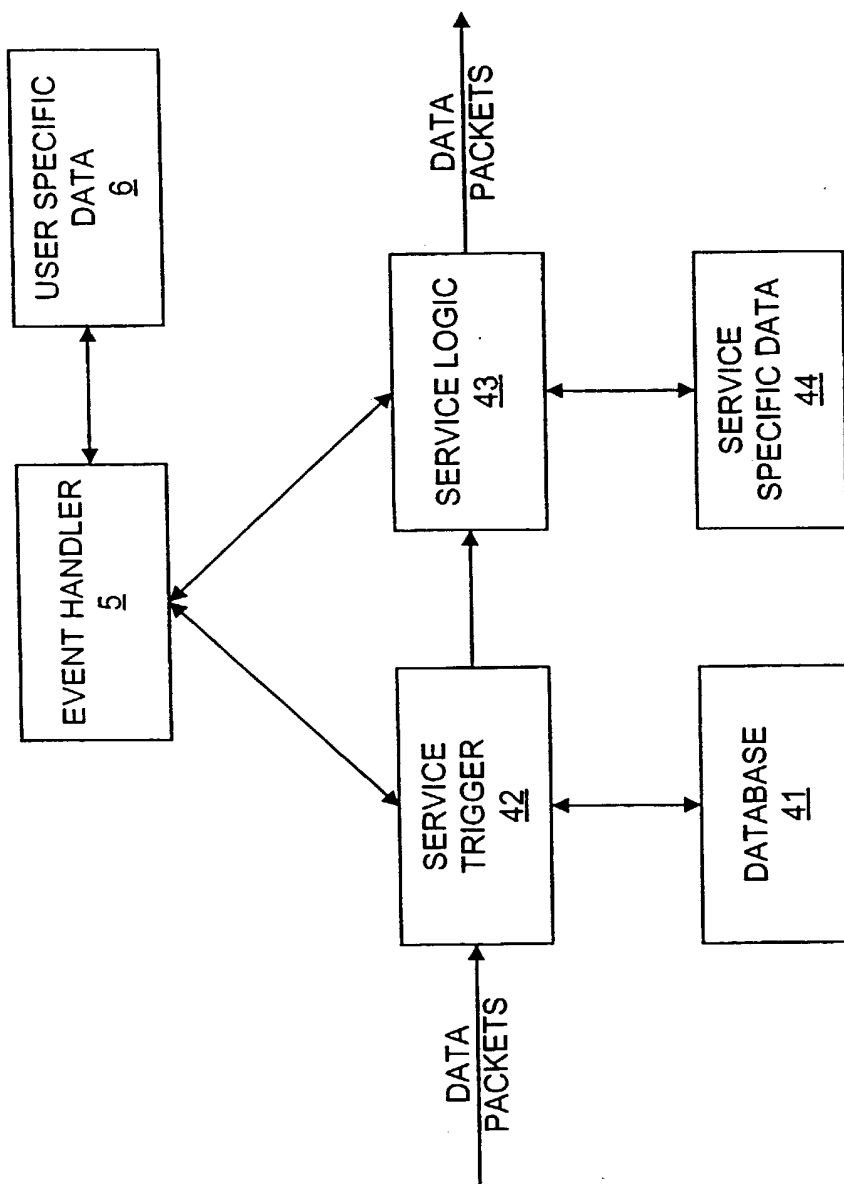


FIG. 3

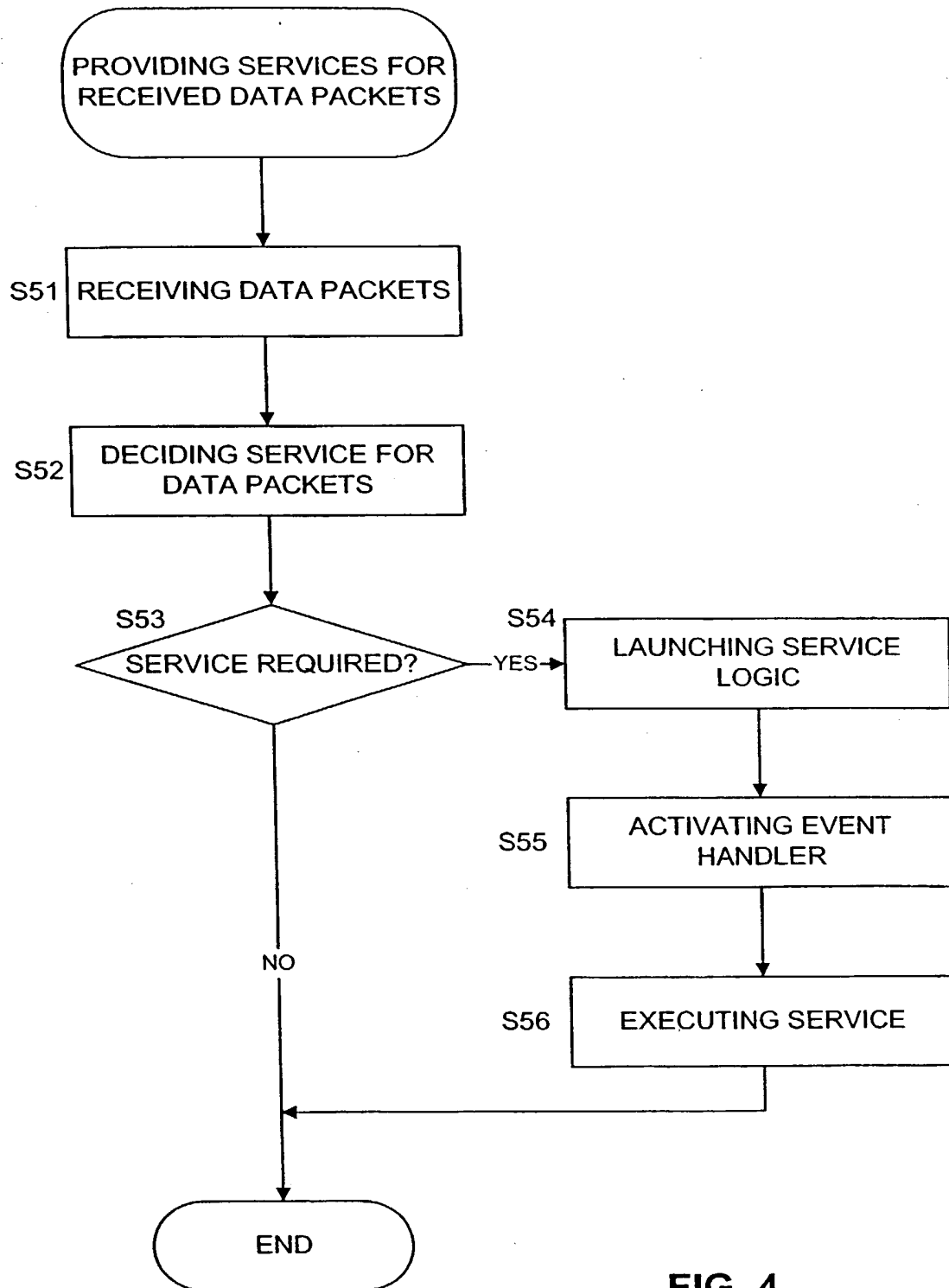



FIG. 4

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY Includes Reference to PCT International Applications			Attorney's Docket No. 4925-213PUS	
<p>As a below named inventor, I hereby declare that:</p> <p>My residence, post office address and citizenship are as stated below next to my name.</p> <p>I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:</p> <p>ADVANCE SERVICE ARCHITECTURE FOR NEXT GENERATION NETWORK SERVICES AND INTELLIGENT DATA NETWORK ROUTER</p> <p>the specification of which (check only one item below)</p> <p><input type="checkbox"/> is attached hereto</p> <p><input checked="" type="checkbox"/> was filed as United States application</p> <p>Serial No. <u>10/070,212</u></p> <p>on <u>28 February 2002</u></p> <p>and was amended</p> <p>on <u>28 February 2002</u> (if applicable).</p> <p><input type="checkbox"/> was filed as PCT international application</p> <p>Number <u>PCT/EP00/03478</u></p> <p>on <u>17 April 2000</u></p> <p>and was amended under PCT Article 19</p> <p>on _ (if applicable).</p> <p>I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.</p> <p>I acknowledge the duty to disclose information which is material to the patentability of the application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).</p> <p>I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.</p>				
PRIOR FOREIGN/PCT APPLICATIONS AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:				
Country (if PCT, indicate "PCT")	Application Number	Date of Filing (day, month, year)	Priority Claimed Under 35 U.S.C. 119	
PCT	PCT/EP99/06759	13 September 1999	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
PCT	PCT/EP00/03478	17 April 2000	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO

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I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:				
PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:				
U.S. APPLICATIONS			STATUS (check one)	
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
PCT APPLICATIONS DESIGNATING THE U.S.				
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)		
PCT/EP00/03478	17 April 2000		x	
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02760

Combined Declaration for Patent Application and Power of Attorney (Continued) (Includes Reference to PCT International Applications)				Attorney's Docket No. 4925-213PUS
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<p>I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.</p>				
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DATE 4/12/2002		DATE 5/28/2002		DATE 15/04/2002
SIGNATURE OF INVENTOR 204		SIGNATURE OF INVENTOR 205		SIGNATURE OF INVENTOR 206
DATE 04/05/2002		DATE 06/05/2002		DATE 03/05/2007
SIGNATURE OF INVENTOR 207		SIGNATURE OF INVENTOR 208		SIGNATURE OF INVENTOR 209
DATE 25.4.02		DATE 25.4.02		DATE 16.5.02
SIGNATURE OF INVENTOR 210		SIGNATURE OF INVENTOR 211		SIGNATURE OF INVENTOR 212
DATE 04/29/2002		DATE		DATE